

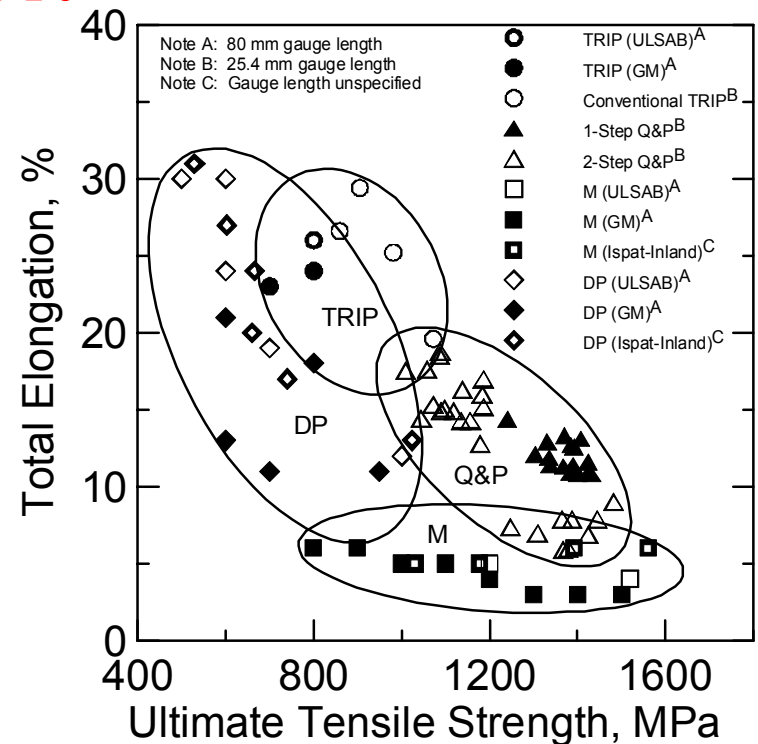
Inter-American Materials Collaboration: New Steels Developed Through Carbon Partitioning

John Speer and David Matlock, Colorado School of Mines,

DMR-0303510

Steels contribute to society in many ways through applications in construction, transportation, energy, etc., and the science and technology related to steel products is constantly evolving.

A new theory has recently been developed which hypothesizes new microstructures, based on a new heat treatment process called “quenching and partitioning” or Q&P. This process is being explored by an international research team of metallurgists and materials scientists.



Total elongation vs. ultimate tensile strength for transformation-induced plasticity (TRIP), Dual phase (DP), martensitic (M), and Q&P sheet steel products. These results illustrate the attractive property combinations that have been achieved already via Q&P, effectively extending the properties of TRIP sheet steels to higher strength levels.

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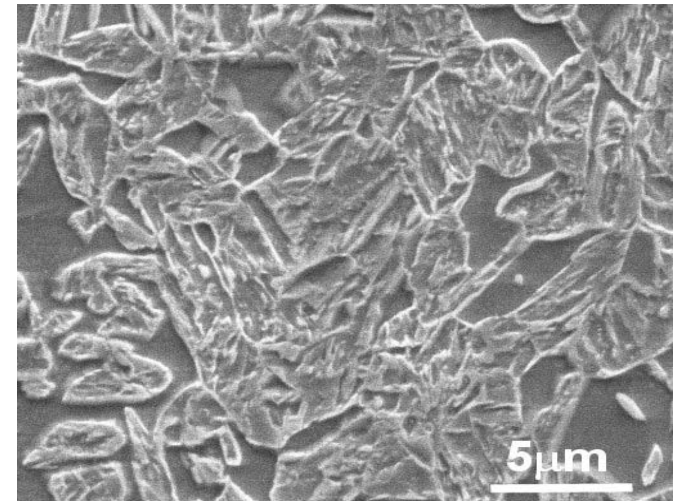
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Education:

The project began in August 2003, and has already involved the support of several students, including: Amy Streicher, a Ph.D. student at Colorado School of Mines working on sheet steels, Florian Gerdemann, from Aachen University (Germany) and Dustan Barnes from Oxford University (UK) working on gear and bearing steels, and a team of five Colorado School of Mines undergraduate students working on a senior class project involving Q&P response of ductile cast-iron, along with Jeremy Wyatt, a summer undergraduate researcher. A new graduate student will also join the project full-time in September 2004.

Newly created microstructure of a steel treated using the Q&P process, as viewed in the scanning electron microscope. The various features control the properties of the steel, and include different morphologies of ferrite, martensite and austenite.



Collaboration:

Formal collaboration currently involves Pontificia Universidade Catolica de Rio de Janeiro in Brazil, whose activity is sponsored by CNPq in Brazil, the University of Leeds, sponsored by the EPSRC in the UK, and Gent University in Belgium. Industrial collaborators include members of the Advanced Steel Processing and Products Research Center, and NSF Industry/University Research Center at Colorado School of Mines.